Claims

1. A composition comprising a nucleic acid molecule encoding a fusion polypeptide, said fusion polypeptide comprising

    a first amino acid sequence which is selected from: a carbohydrate binding domain of a collectin; a carbohydrate binding domain of a galectin; a carbohydrate binding domain of a C-type lectin; or an amino acid sequence which can bind to a carbohydrate on a glycoprotein, said carbohydrate being chosen from the group: D-mannose, D-glucose, D-fucose, L-fucose, N-acetyl-beta-D-glucosamine, N-acetyl-beta-D-glucosamine, a sialic acid; and

    a second amino acid sequence comprising a ligand for a cell surface polypeptide, said ligand being chosen from the group: a ligand for a cytokine receptor, a ligand for CD40, a ligand for an adhesion molecule, a ligand for a defensin receptor, a ligand for a heat shock protein receptor, a ligand for a counterreceptor for a T cell costimulatory molecule.

2. The composition of claim 1, wherein said first amino acid sequence is N-terminal to said second amino acid sequence.

3. The composition of claim 1, wherein said first amino acid sequence is C-terminal to said second amino acid sequence.

4. The composition of claim 1, wherein said first amino acid sequence can bind to a sialic acid on a glycoprotein, said sialic acid comprising at least one of the following carbohydrate structures: N-acetylneuraminic acid, alpha-NeuNAc-[2->6]-Gal, alpha-NeuNAc-[2->6]-GalNAc, alpha-NeuNAc-[2->3]-Gal.

5. The composition of claim 1, wherein said first amino acid sequence comprises a carbohydrate-binding domain of a naturally occuring lectin.

6. The composition of claim 1, wherein said first amino acid sequence comprises at least about 10 contiguous amino acids of a hemagglutinin.

7. The composition of claim 6, wherein said hemagglutinin is an influenza virus hemagglutinin.

8. The composition of claim 7, wherein said contiguous amino acids of an influenza hemagglutinin are contiguous amino acids of an influenza hemagglutinin HA1 domain.

9. The composition of claim 7 , wherein said influenza virus is an influenza A virus.

10. The composition of claim 7, wherein said influenza virus is of a subtype that infects humans.

11. The composition of claim 9 , wherein said influenza virus is of an H1 subtype.

12. The composition of claim 11, wherein said influenza virus is from the strain A/PR/8/34.

13. The composition of claim 9, wherein said influenza virus is of an H2 or H3 subtype.

14. The composition of claim 7, wherein said influenza virus is of a subtype that does not infect humans.

15. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a mammalian cell surface polypeptide.

16. The composition of claim 15, wherein said ligand for a cell surface polypeptide is a ligand for a mouse cell surface polypeptide.

17. The composition of claim 15, wherein said ligand for a cell surface polypeptide is a ligand for a human cell surface polypeptide.

18. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a cell surface polypeptide of a leukocyte.

19. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a cell surface polypeptide of an antigen presenting cell.

20. The composition of claim 19, wherein said ligand for a cell surface polypeptide is a ligand for a cell surface polypeptide of a professional antigen presenting cell.

21. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a cell surface polypeptide of a dendritic cell.

22. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a mouse GM-CSF receptor.

23. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a mouse GM-CSF.

24. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a mouse GM-CSF.

25. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a human GM-CSF receptor.

26. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a human GM-CSF.

27. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a human GM-CSF.

28. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for an interleukin.

29. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a mouse interleukin.

30. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a human interleukin.

31. The composition of claim 28, wherein said interleukin is chosen from the group: IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12, IL-13, IL-14, IL-15, IL-16, IL-17, IL-18, IL-19, IL-20, IL-21, IL-22, IL-23, IL-24, IL-25.

32. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about 5 contiguous amino acids of an interleukin.

33. The composition of claim 32, wherein said interleukin is chosen from the group: IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12, IL-13, IL-14, IL-15, IL-16, IL-17, IL-18, IL-19, IL-20, IL-21, IL-22, IL-23, IL-24, IL-25.

34. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises an interleukin.

35. The composition of claim 34, wherein said interleukin is chosen from the group: IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-12, IL-13, IL-14, IL-15, IL-16, IL-17, IL-18, IL-19, IL-20, IL-21, IL-22, IL-23, IL-24, IL-25.

36. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a chemokine.

37. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a mouse chemokine.

38. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a human chemokine.

39. The composition of claim 36, wherein said chemokine is a C-C cytokine.

40. The composition of claim 36, wherein said chemokine is a C-X-C cytokine.

41. The composition of claim 36, wherein said cell surface polypeptide is chosen from the group: CXCR-1, CXCR-2, CXCR-3, CXCR-4, CCR-1, CCR-2, CCR-3, CCR-4, CCR-5, CCR-6, CCR-7, CCR-8.

42. The composition of claim 36, wherein said chemokine is chosen from the group: 9E3, AMCF, beta-thromboglobulin, ENA-78, eotaxin, eotaxin-2, IP-10, KC, LIX, mig, MGSA, mob-1, NAP-2, NAP-3, NAP-4, PBSF, MGSA, mouse KC, MIP-2, MIP-1 alpha, NAP-2, ENA-78, GCP-2, ACT-2, C10, CCF18, DC-CK1, ELC, Exodus, FIC, GDCF, GDCF-2, HC-21, HCC-1, I-309, JE, LAG-1, MARC, MCAF, MCP-1, MCP-2, MCP-3, MCP-4, MCP-5, MRP-2, RANTES SDF, TARC, ATAC, Ltn, SCM-1, neurotactin.

43. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about 5 contiguous amino acids of a chemokine.

44. The composition of claim 43, wherein said chemokine is chosen from the group: 9E3, AMCF, beta-thromboglobulin, ENA-78, eotaxin, eotaxin-2, IP-10, KC, LIX, mig, MGSA, mob-1, NAP-2, NAP-3, NAP-4, PBSF, MGSA, mouse KC, MIP-2, MIP-1 alpha, NAP-2, ENA-78, GCP-2, ACT-2, C10, CCF18, DC-CK1, ELC, Exodus, FIC, GDCF, GDCF-2, HC-21, HCC-1, I-309, JE, LAG-1, MARC, MCAF, MCP-1, MCP-2, MCP-3, MCP-4, MCP-5, MRP-2, RANTES SDF, TARC, ATAC, Ltn, SCM-1, neurotactin.

45. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a chemokine.

46. The composition of claim 45, wherein said chemokine is chosen from the group: 9E3, AMCF, beta-thromboglobulin, ENA-78, eotaxin, eotaxin-2, IP-10, KC, LIX, mig, MGSA, mob-1, NAP-2, NAP-3, NAP-4, PBSF, MGSA, mouse KC, MIP-2, MIP-1 alpha, NAP-2, ENA-78, GCP-2, ACT-2, C10, CCF18, DC-CK1, ELC, Exodus, FIC, GDCF, GDCF-2, HC-21, HCC-1, I-309, JE, LAG-1, MARC, MCAF, MCP-1, MCP-2, MCP-3, MCP-4, MCP-5, MRP-2, RANTES SDF, TARC, ATAC, Ltn, SCM-1, neurotactin.

47. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for an interferon.

48. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a mouse interferon.

49. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a receptor for a human interferon.

50. The composition of claim 47, wherein said interferon is chosen from the group: an interferon-alpha, an interferon-beta, an interferon gamma.

51. The composition of claim 47, wherein said ligand for a cell surface polypeptide comprises at least about 5 contiguous amino acids of an interferon.

52. The composition of claim 47 wherein said interferon is chosen from the group: an interferon-alpha, an interferon-beta, an interferon gamma.

53. The composition of claim 47, wherein said ligand for a cell surface polypeptide comprises an interferon.

54. The composition of claim 53, wherein said interferon is chosen from the group: an interferon-alpha, an interferon-beta, an interferon gamma.

55. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a mouse TNF-alpha receptor.

56. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a mouse TNF-alpha.

57. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a mouse TNF-alpha.

58. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a human TNF-alpha receptor.

59. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a human TNF-alpha.

60. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a human TNF-alpha.

61. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a mouse flt-3 receptor.

62. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a mouse flt-3.

63. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a mouse flt-3.

64. The composition of claim 1, wherein said ligand for a cell surface polypeptide is a ligand for a human flt-3 receptor.

65. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises at least about five contiguous amino acids of a human flt-3.

66. The composition of claim 1, wherein said ligand for a cell surface polypeptide comprises a human flt-3.

67. The composition of claim 1, wherein said encoded fusion polypeptide further comprises a linker interposed between said first and second amino acid sequences.

68. The composition of claim 67, wherein said linker has the formula $(Gly_xSer)_n$, wherein n is an integer between 1 and 15, and x is an integer between 1 and 10.

69. The composition of claim 1, wherein said encoded fusion polypeptide further comprises a secretory signal sequence.